CSS/British Horse Society ENG 03/05

horses and highway surfacing

The British Horse Society
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County Surveyors' Society

A guidance note for highway authorities

guidance notes for highway authorities

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contents

executive summary

The grip or lack of it between a metal horseshoe and the surface beneath has always been a cause for concern for users of horses.

With the introduction of various thin surface courses, an increase in the number of occasions when horses slip on the highway surface has been reported.

CSS established a Task Group that worked with BHS to develop this Guidance Note. A questionnaire was sent to Highway Authorities and an incident report form was made available on the BHS website.

It was agreed that in certain circumstances a surface "treatment" to increase friction is appropriate.

CSS guidance to Highway Authorities –

Areas to be treated must be determined locally. Complaints should be followed by an investigation.

Appropriate methods of treatment include:

- gritting during construction
- surface application or texturing post construction

BHS guidance to horse riders –

All horse owners using the highway in any context must exercise their duty of care as a road user together with their duty as horse owner.

introduction

An increase in the number of reports of incidents of horses 'slipping' on road surfaces was brought to the attention of CSS Soils & Materials Design & Specification Group. A Task Group was established with a brief to meet with the British Horse Society and develop a guidance note.

current situation

The profile of the horse rider / surfacing interface has been raised in a number of Highway Authorities either directly by riders or indirectly via BHS or the media. Various myths exist particularly based on anecdotal rather than factual evidence.

There are various different equestrian user types such as:

- Mounted police/military
- Primarily road users
- Horse drawn vehicles
- Carriages, funerals, drays and leisure drivers
- Racing stables/National Hunt
- Eventers
- Leisure

Horse shoes are very varied for all the groups involved. For example, mounted police / military / horse drawn vehicle drivers, who tend to use regular routes, use slightly heavier shoes whereas race horses are shod in a much lighter material. Road nails or studs may be used by any of the above as a matter of personal preference and suitability.

In the past, main roads were generally surfaced with bituminous macadam or rolled asphalt with precoated chippings, and surface dressing was widely used on the rural network. Further back, cobbles were widely used on city streets. There were occasional reports of horses slipping, generally dealt with at a local level, and indeed, treated as the horse operator's problem rather than the highway authority's. These reports have increased in the last decade, and particularly the last 5 years, and tend to be attributed to the binder rich thin surfacing material, generally reported as SMA. This name covers a variety of products in increasing use by the highway industry, generally HAPAS approved, and technically known as "thin wearing course".

the issue

The likelihood of slipping is governed by the interface between the steel shoe of the horse and the road surface. In the case of fresh bituminous macadam or SMA, this is the binder covered surface course. Initially the binder film results in an apparently "slippery" and reflective surface. This is a temporary phenomenon which reduces as binder wears off and aggregate is exposed.

Polishing of aggregate and fatting up of surface dressing has occurred in the past resulting in a surface slippery to the horse. However it was normally rectified by routine highway maintenance. Some early life problems were reported on DBM surface course. Now the variety of new surface courses have a thicker binder film, often containing a polymer to improve its effectiveness, but reportedly resulting in a potentially "more slippery" surface to the horse.

The extent of the problem and to which surface courses it actually applies is currently unknown as all reports tend to refer to "SMA", whether this is actually the surface material or not.

consultation

The Task Group developed a questionnaire (see Annex A), which was sent to all Highway Authorities. Some 25 responded with a variety of replies, which can be summarised as follows:

- 70% have received complaints
- Many use negative textured surfacing
- SMA is not deemed worse or different to other surfaces
- Majority have not changed their surfacing policy
- Majority do not choose 'horse-friendly' surface by design
- Majority consider slipping is not a problem to date
- Horses have always slipped on occasions

In conjunction with the BHS, CSS helped produce a standard form (see Annex B) which is now located on the BHS website at **www.bhs.org.uk** and can be used by members to report slipping problems. At the time of writing, 61 completed responses have been received. However prior to this form there is evidence of various incidences around the country and this is confirmed by the experience of some of the Task Group members in their Authorities. It was also indicated that many horse riders do use road nails and some reported still to have slipped.

Horses' shoes vary enormously in size, weight, shape, design etc. Some farriers make their own shoes rather than purchase them ready-made. Remedial shoes are entirely different and can be made of substances such as plastic or aluminium and can have a wide variety of shape dependent on the problem that is being addressed. The design of the shoe and its condition will have an impact on its susceptibly to slipping.

analysis

It was agreed that in certain circumstances a surface "treatment" may be appropriate to facilitate early removal of the surface binder film on the aggregate and increase the initial grip.

In areas where a problem is shown to exist, the Highway Authority should include a statement regarding this matter within their surfacing or skid resistance policy. It should cover the treatment type proposed and the circumstances in which it is undertaken.

This report deals with slipping by horses in the early life on negatively textured surfaces. It is recognised that horses may also slip in other circumstances such as a "fatty" (binder rich) surface dressing.

css guidance to highway authorities

The treatment alternatives are:

(i) grit during construction process (eg 3mm quartzite at 1kg/m2)

This method is quick and cost effective as the grit is applied during the initial rolling process (after about 3 – 5 passes of the primary roller). The grit can be applied by hand but on larger sites the use of a calibrated roller-mounted gritter is preferable. The excess grit is removed by sweeping prior to opening the surface to traffic. There is some initial minimal reduction in macrotexture but by using a clean grit with a low affinity to bitumen, e.g., quartzite any initial reduction in macrotexture is relatively short lived.

An additional advantage of gritting the surface is that there is no "shine" on the surface as is normally associated with the use of materials with thicker binder films. Use of this method in Devon & Cambridgeshire has proved to provide surfaces immediately suitable for correctly shod horses.

The following grading of quartzite grit has been found to be effective. Other similar aggregate types & grading may be equally effective but it is essential to carry out trials to quantify this.

Grit for surface application to SMA - Aggregate Grading	
BS test sieve:	**% passing**
6.3mm	100
5.0mm	95 - 100
3.35mm	66 - 90
1.18mm	0 - 20
600µm	0 - 8
75µm	0 - 1.5

(ii) Post Treatment

At present it is recognised that it is not always possible to establish at the design stage whether the specific highway is a 'horse route' and therefore some form of post treatment may be necessary following an investigation should a problem become evident later.

Surface Applications

The simplest form of post treatment would be the application of surface dressing, but this negates the original design decision to lay the new negative textured surface course. It is however possible that selective patches of surface dressing may overcome the problem.

The post application of dry uncoated grit similar to the 'concurrent' operation is reasonably effective. The grit needs to be spread at 1kg/m2 and rolled with a steel roller to abrade the bituminous film. An alternative method using the application of a hot (160°C) uncoated grit has been trialled and appears to be effective in dry weather. To avoid slipping problems on the surplus grit the surface should be swept the following day and the public protected with appropriate signage.

Texturing

Mechanical wire brushing can remove some binder film but it is a slow and laborious process and can simply smear the bitumen as opposed to removing the binder film. Water jetting with high pressure or mechanical texturing is more effective and can be used in relatively short lengths where horse riders are experiencing difficulties. However both these methods are expensive for small isolated areas, and excess force to remove the bitumen film may have a long-term detrimental effect on the overall life of the surfacing. Careful control will be necessary to ensure no long-term damage occurs

Areas to be treated must be determined locally and may include:

a) Gradients

b) Normal routes, particularly rural routes, joining or used by horse riders to reach bridleways and other off road routes

c) Roads adjacent to racecourses and riding stables

It is suggested that "horse use" maps are created, in a similar manner to cycle maps, indicating those roads that will be treated if a new negatively textured surface is applied to those lengths.

It was also noted that the highlighted roads on the map could be deemed Streets with Engineering Difficulties and all reinstatements in the same material should have grit applied at the time of laying.

Consideration was given to bridleway crossing points on Principal Roads and it was agreed that Highway Authorities should consider a specialist high friction surface over a narrow width crossing the road. This will give confidence to the horse rider that it is not slippery and will highlight to the road user that there is something different.

If complaints of the surface being slippery are received, an investigation shall be undertaken.

This should include written documentation on the condition of the surfacing, the type of surfacing and comments relating to the geometry of the highway. Details will also be required on the horse, and the condition of the horse's shoes. In the case of litigation, farrier's records will be required to assess the condition of the horse's shoes at the time of the incident.

Any decisions following the investigation should be formally documented.

bhs guidance to horse riders

As with all road users the horse rider must accept responsibility for their "vehicle", the horse, as with a driver and the car. Note the requirements for MOT and minimum tyre tread. All horse owners, riders and carriage drivers, have a duty of care to ensure that regular appointments are made with their farrier for foot trimming or shoeing, and this is especially vital for those who take horses onto the roads or any hard surfaced areas. If the horse is shod and regularly exercised on the road or hard surfaced areas, attention must be paid to the level of wear on the shoes. Roads and hard surfaced areas should be avoided if the shoes are shiny and/or thin. If a road nail is used, then it is important that the road nail has not become dislodged and has been correctly fitted by the farrier. Loose shoes can cause horses to stumble or trip and therefore horses should not be ridden until the farrier has been and re-shod the horse.

future research needs

Although current testing mechanisms were investigated and used, none is deemed to replicate the interface between horseshoe and road surface. On behalf of CSS, Keith Grant, Devon CC, is researching a test methodology to quantify the horseshoe/road surface interaction in order to consider the grip that occurs.

annex a - questionnaire

Horses & Negative Textured Surfaces

Respondent: Phone:

Position/Role: Date:

Fax: Email:

If replying using a paper copy please circle the letter that best represents your answer to the following questions. If you have any additional comments please make them at the end of the form.

1. Have you received complaints relating to the slippery nature of road surfaces to horses?
   a. **Yes**
   b. **No**

2. Do you use Negative Textured Surfaces as a surface course?
   a. **Yes**
   b. **No**

3. Has the number of these complaints increased or decreased recently?
   a. **Increased**
   b. **Decreased**
   c. **No information either way**

4. If an increase, does this correlate with recent publicity e.g., in "Horse & Hound"?
   a. **Yes**
   b. **No**
   c. **Not known**

5. If an increase or decrease does this correlate with your change in use of Negative Textured Surfaces?
   a. **Increased due to greater use**
   b. **Decreased due to reduced use**
   c. **No obvious correlation**

6. Have you any evidence as to the nature of the problem?
   a. **Yes**
   b. **No**

   If yes please give details:

7. Is SMA worse than or different to other Negative Textured Materials?
   a. **Worse than**
   b. **No worse than**
   c. **Different to**
   d. **No different to**
   e. **Not known**

8. Have you altered your surfacing policy because of the concerns?
   a. **Yes**
   b. **No**
   c. **Considering**

9. Does your choice of surfacing include that thought to be "horse-friendly"?
   a. **Yes**
   b. **No**

   If yes please give details:

10. Was this in response to identified problems of slip?
    a. **Yes**
    b. **No**

11. Have you resolved the problem of horses slipping?
    a. **Yes**
    b. **No**
    c. **Awaiting data**
    d. **Not a problem to date**

12. If "Yes" do you have any additional specification in relation to early life skid/slip, e.g., gritting or is there another reason?
    a. **Additional specification**
    b. **Other reason**

    Please give details:

13. Do you use generic Negative Textured Surfaces or HAPAS certificated mixtures?
    a. **Generic negative textured surfaces only**
    b. **HAPAS only**
    c. **Both**

14. If "Both" is there a discernable difference in terms of slip-related complaints/problems?
    a. **Yes**
    b. **No**

15. What if any is your current stated policy regarding horses and any Negative Textured Surfacing?

16. **Any additional comments:**

Thank you for your time!

Please return your completed questionnaire to:

Keith Grant
Devon County Council
Materials Laboratory
Elm Grove Road
Topsham
Exeter
EX3 0BW

Telephone: **01392 666500**
Fax: **01392 666477**

annex b - bhs website form

Horses /Road Surface Interface Incident Report Form

Name:

Address:

Telephone number:

Date of incident:

What time of the day did the incident happen?

Please give details of the incident (what happened?)

Where did the incident happen? (Please specify Road number, name and location e.g. outside house number 42)

Village/Town: County:

Did this stretch of road have a verge? Y/N:

If yes, please give details:

Did the incident occur on a gradient? Y/N:

Did the incident occur at a change of surface? Y/N:

What were the weather conditions at the time of the incident? (wet, dry etc)

Were any other people/vehicles involved?

Were you riding the normal line or was there a reason to be elsewhere in the road?

Was normal control maintained or had the horse been "spooked" by other factors?

What road use experience does the rider have?

Have you had BHS training for road use with a horse? Y/N:

Where any injuries received by yourself? Y/N:

If yes, please give details:

Were any injuries received by your horse? Y/N:

If yes, please give details:

At the time of the incident did your horse have shoes fitted? Y/N:

If so, were you using road studs? Y/N:

If so, please specify the type (e.g. removable road studs, nails etc)

Have you been in touch with the local Highways Authority or County Council to verify the type of surface? Y/N:

If yes, please give details of who, where and what:

Please give any further details that you feel may be relevant:

Signature:

Date:

annex c - css task group

- Stephen Child - *SMDS Secretary, Surrey County Council*
- Keith Grant - *Devon County Council*
- John Thorp - *Lancashire County Council*
- John McRobert - *Road Service NI (Reviewer)*

The advice, input and enthusiasm of Sheila Hardy, Senior Executive Safety, BHS, is much appreciated and has contributed in no small part to the production of this document. The input of BHS and its representatives is also recognised.